Human Effectiveness Directorate

USAF Scientific Advisory Board 1999 S&T Program Review Distributed Mission Training: Aircrew Training Effectiveness Research

Air Force Research Laboratory | AFRL
Science and Technology for Tomorrow's Aerospace Force

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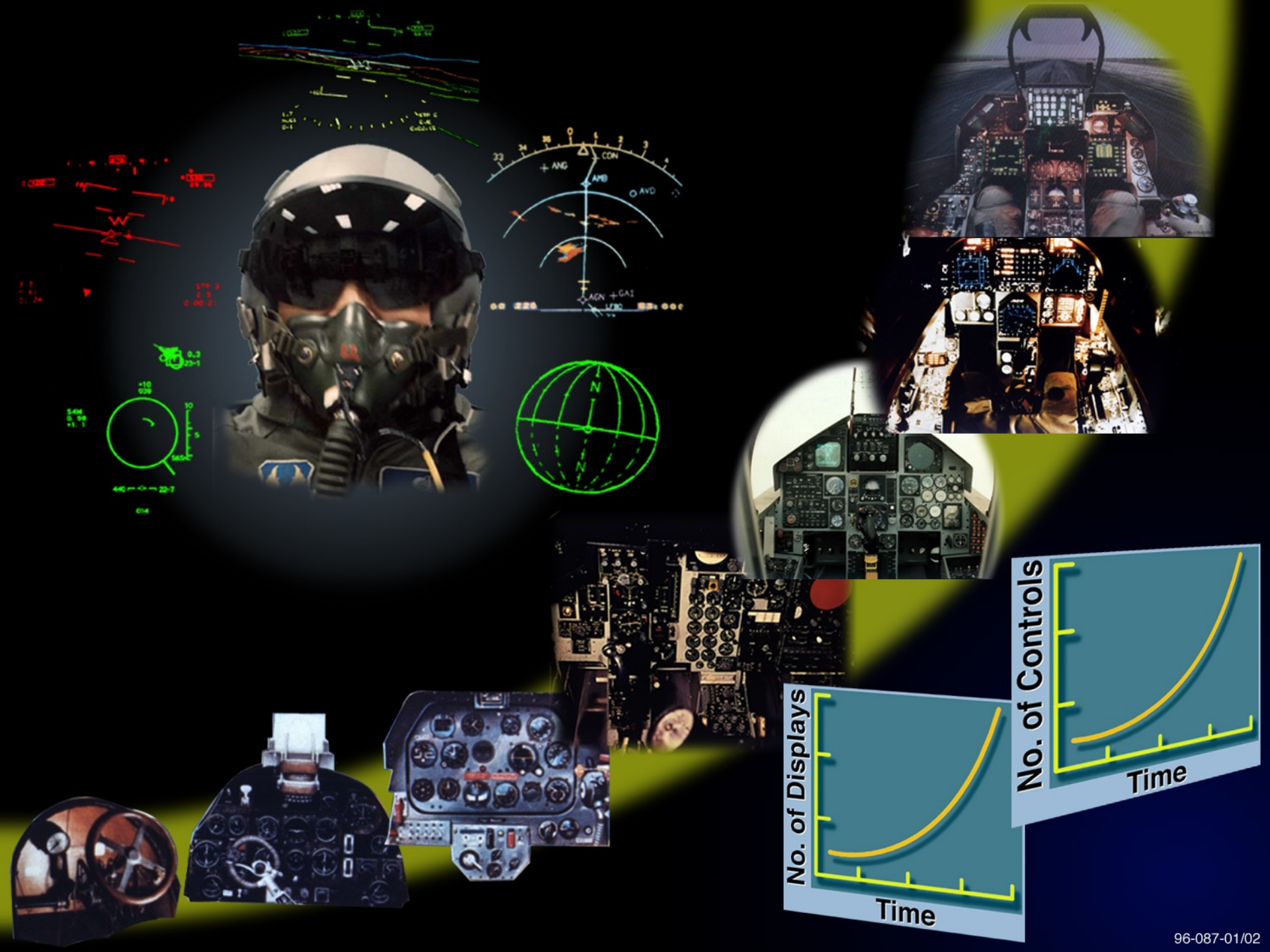
Aircrew Training Effectiveness Research Program

- **Goal: Enable preparation of trained individuals and teams to meet Air Force mission requirements**
- **Objectives: Develop and transition technologies for effective and efficient training**
- **Approach: Use principles of applied cognitive sciences and human factors in cooperation with military, industry, and university communities**

Aircrew Training Research Partners

- Air Force Major Commands
- Army Research Institute
- Naval Air Warfare Center
- Raytheon, Boeing, & Lockheed-Martin
- Klein Associates
- Chi Systems
- Microanalysis and Design
- Aptima
- Georgia Tech Research Institute
- Texas A&M University
- New Mexico State University
- University of Tennessee


No. of Displays
Time
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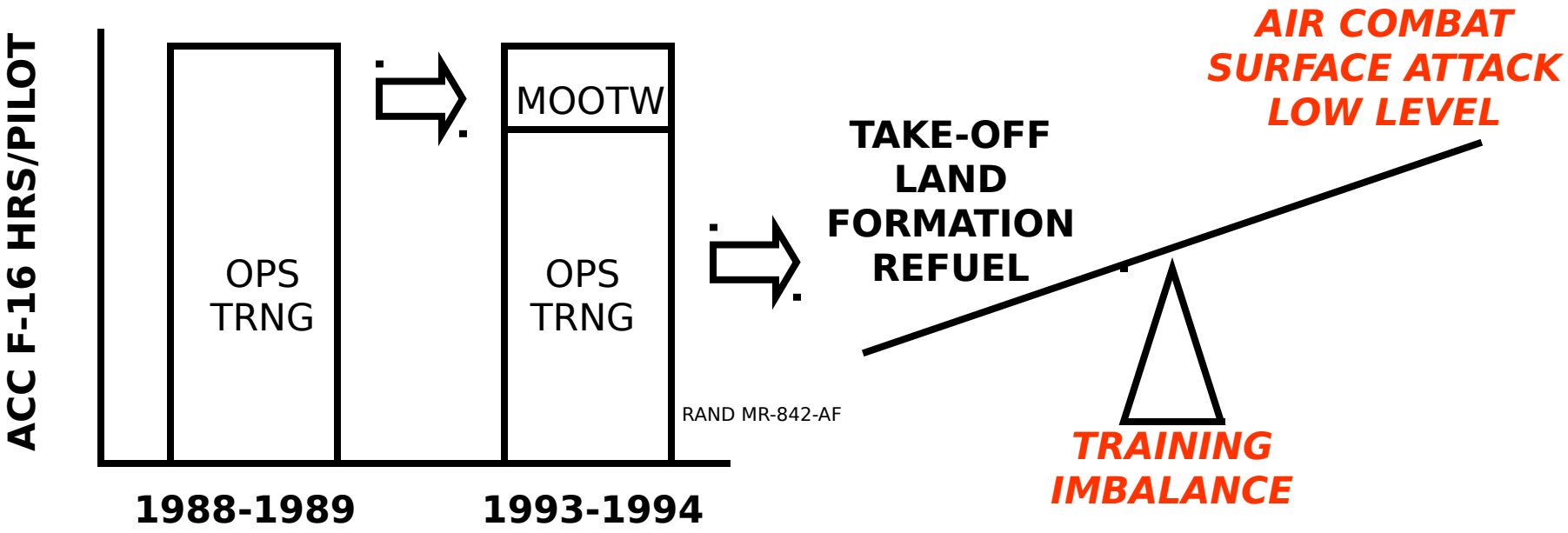
Expanded Operations Means Fewer Flying Hours for High End Training

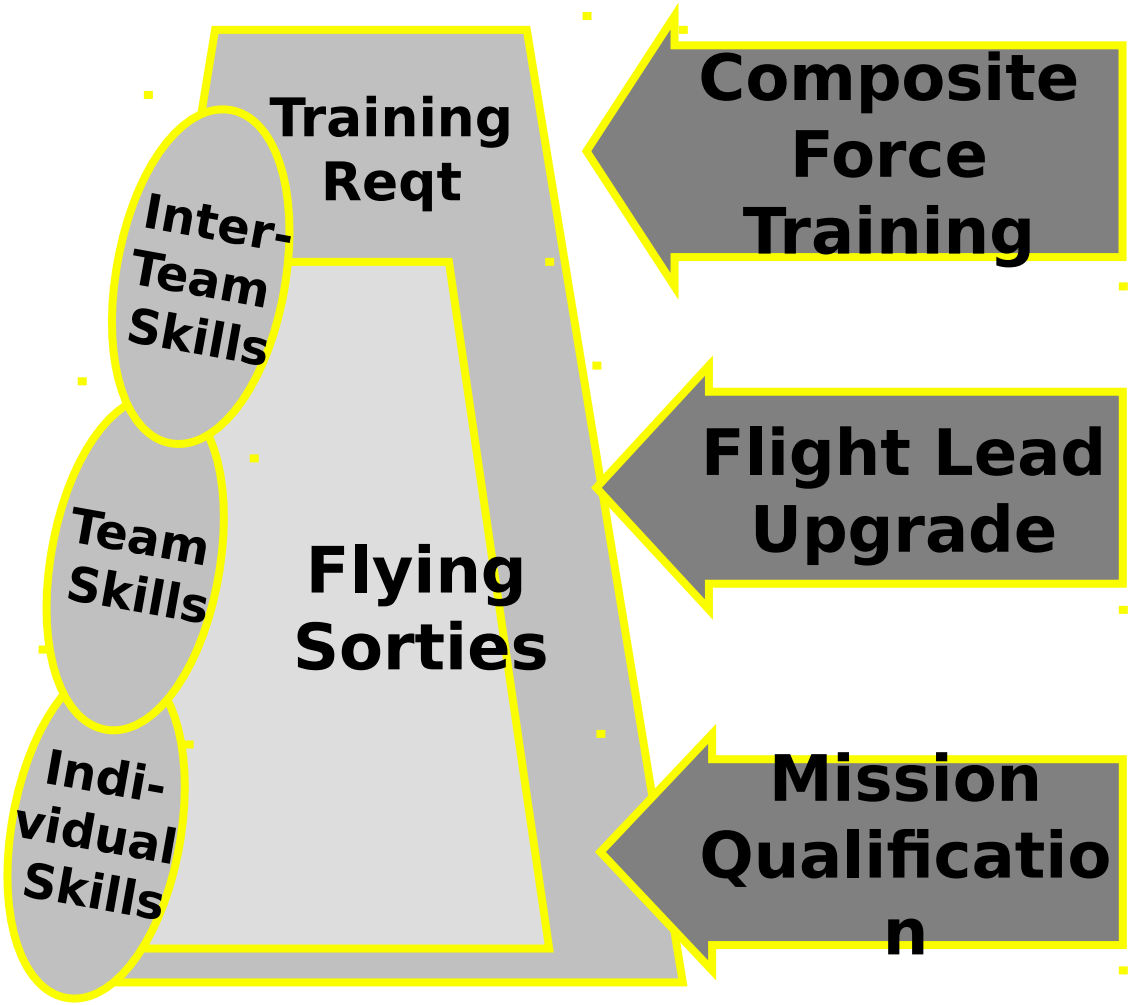


- **"… aircrews are not as proficient at all required tasks when returning from contingency operations as they were when first deployed (ACC/CV, 2 Apr 96)."**
- **Mandatory refresher training for pilots returning from contingency operations**

Reduced Training Opportunities Impact Mission Preparedness

- **Direct relation between training time and bombing accuracy and air combat victories (IDA, 1989)**
- **Perceived situation awareness directly related to flight hours, composite force exercises, and advanced simulation training (Waag & Houck, 1994)**
- **Low density, high demand assets (C2, intell, SOF) unavailable for team training because they are committed to contingency operations (RAND, 1997)**

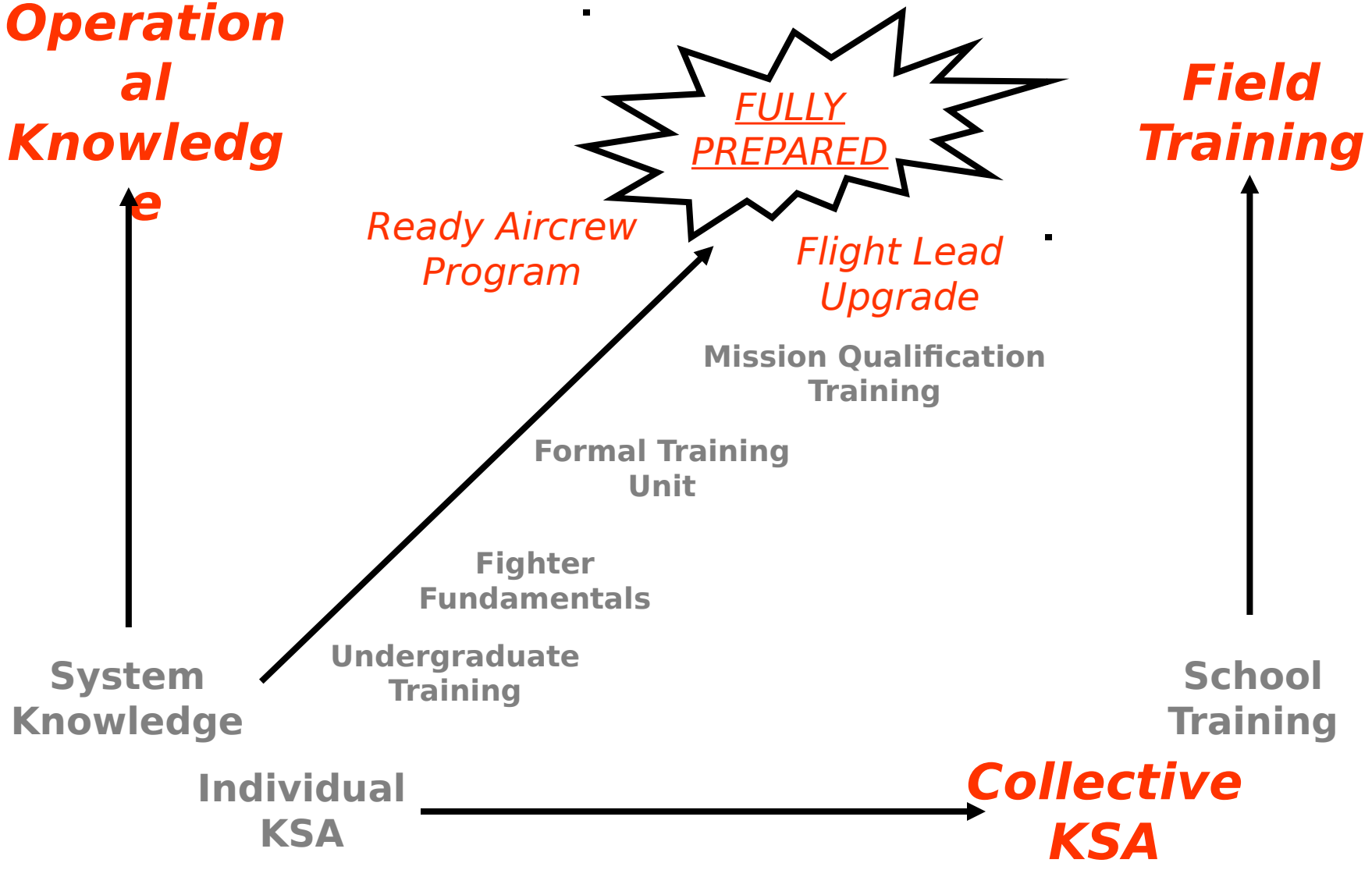
Difficult to Meet All Training Requirements With Aircraft Alone



Mission Essential Competencies

Optimize in-flight and ground-based training

Training Research Focus



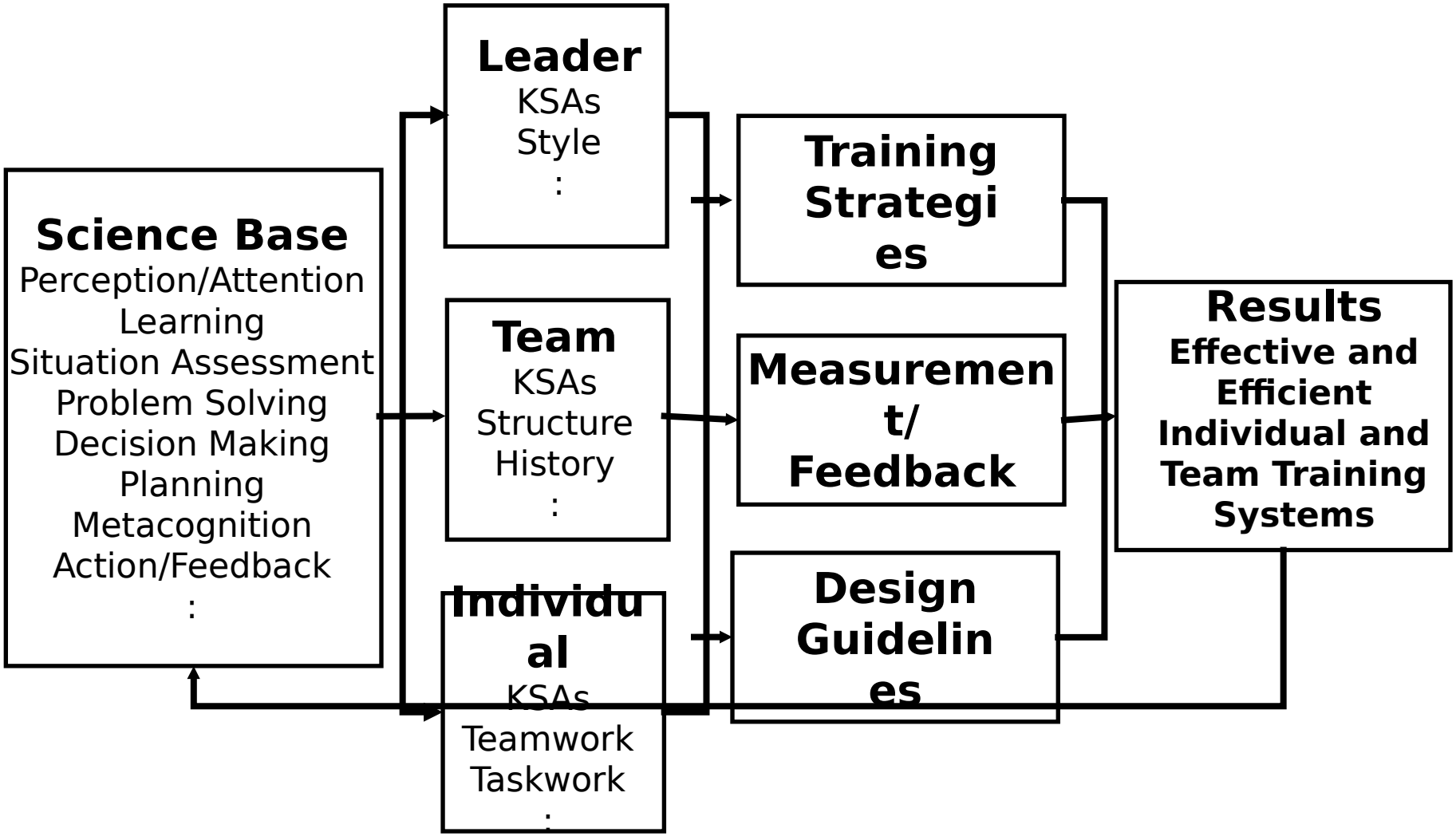
Air Force Needs Training Effectiveness Data

- **“Validate the thesis that there is some portion of our current flying program that produces lower quality training than could be produced from a 4-ship of high fidelity visual simulators linked together and to AWACS and to aggressor sims (COMACC, 23 Jul 97).”**
- **AF DMT technology investment strategy calls for**
  - **Control system development, training, and rehearsal management**
  - **Training strategies**
  - **Performance measurement and feedback**
  - **Cueing, stimulus, and perception**
  - **Cognitive modeling and voice interfaces**
  - **Advanced distributed learning**

ACC/XOD-AFRL/HEA Research Partnership

- **Define mission essential competencies and training requirements**
- **Identify evaluation criteria and measures**
- **Design evaluation plan to include COMACC requested transfer of training study**
- **Conduct training effectiveness research using AFRL/HEA testbed and ACC mission training centers**

Aircrew Training Research Approach



Aircrew Training Effectiveness Research Issues

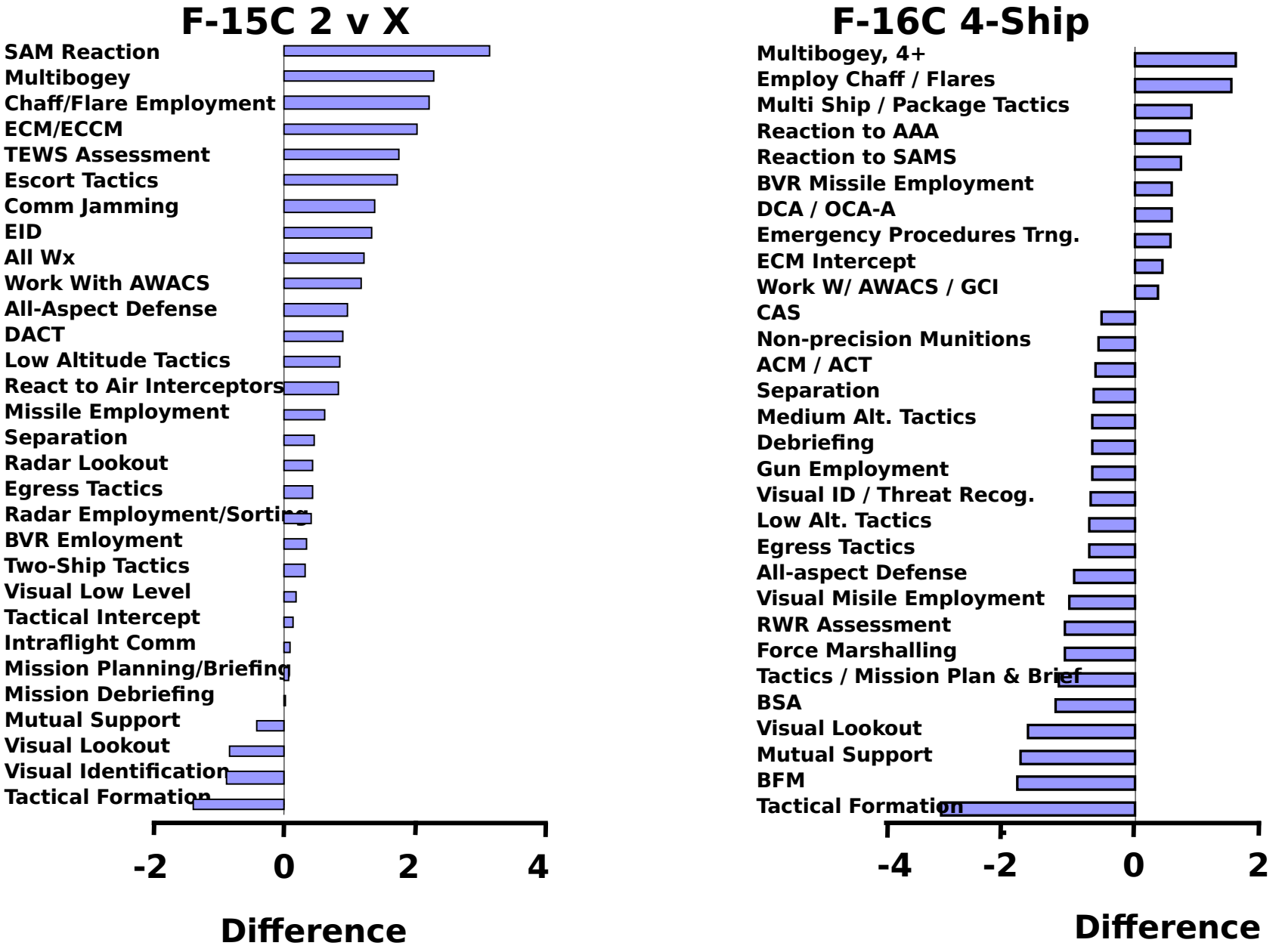
Acceptance

Learning

Transfer

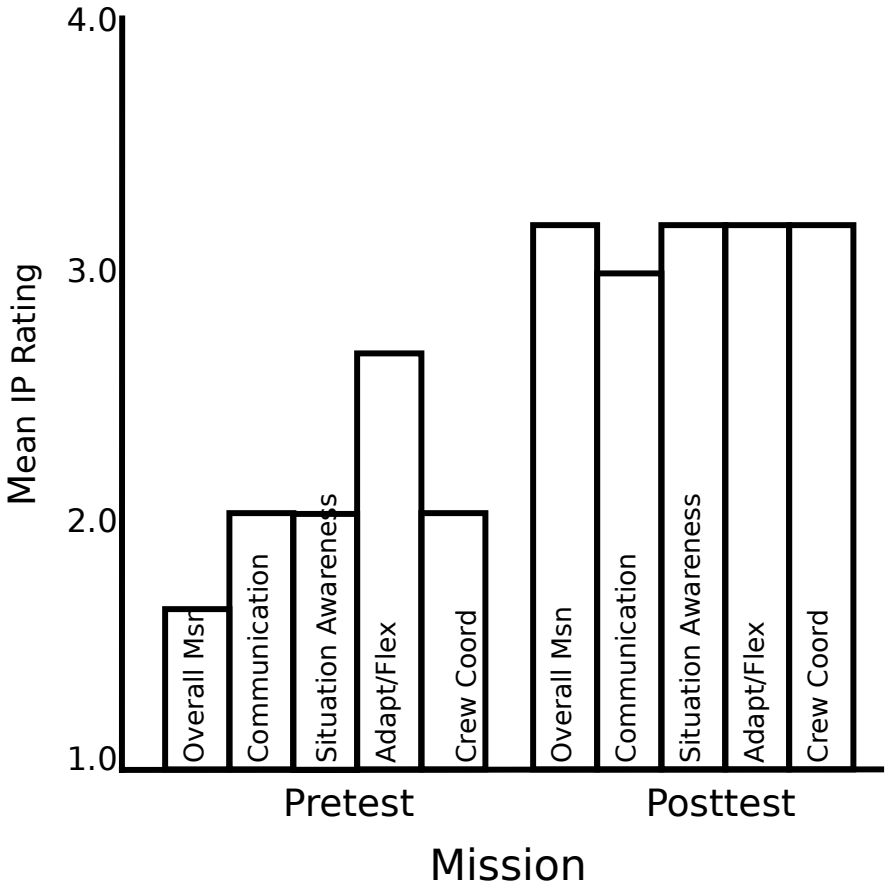
Impact

Acceptability of Simulator-Based Training



Within Simulator Learning: Process and Outcome

- **Design**
  - **Pretest**
  - **Structured training**
  - **Posttest**
- **Significant increase in IP ratings of pilot performance**
- **Significant increase in outcome measures**
  - **25% increase in bomb accuracy**
  - **50% decrease in blue aircraft killed**



F-15 Transfer of Training: Improved Mission Performance

- **Cooperative AFRL-ACC effort**
- **Use ACC Mission Training Centers**
- **Document training transfer**
- **Improve training of mission essential competencies**

Control Group	MTC Fam Flights	Pre-Test in the Aircraft and the MTC	Fly Normal Sortie Schedule			Post-Test in the Aircraft and the MTC	Additional Sorties if Required	
Test Group		MTC Fam Flights	Pre-Test in the Aircraft and the MTC	Training in the MTC and Fly Normal Sortie Schedule			Post-Test in the Aircraft and the MTC	Additional Sorties if Required

F-16 Flight Lead Upgrade: Better Use of Available Sorties

- Cooperative AFRL-ACC effort
- Use AFRL/HEA testbed for continuing research
- Measure return on training investment
  - Performance
  - Refly rates

One ineffective 4 v 4 “costs” the unit 8 sorties

Long-term Payoffs

- **Increased training readiness and mission capabilities**
  - **Mission essential competencies identified and trained**
  - **Strategies for effects-based training**
- **Demonstrated return on investment for training in terms of mission performance and sortie use**
- **Enhanced science and technology for improving human effectiveness**

Training Enables More Effective Mission Performance

"We have some great equipment, no doubt about it. But when you get to the battlefield and when you see our people operate, it is truly the training that makes the difference. It is the great enabler that makes everything else work."
Gen Richard Hawley, I/ITSEC keynote speech December 1, 1998

Training effectiveness research enables the advanced distributed learning technologies and methods needed to better prepare our aircrews to meet mission requirements